

Zero Retries issue 0165 2024-08-16

Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fourth year of publication, with 2000+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

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Web version of this issue - <https://www.zeroretries.org/p/zero-retries-0165>

Request To Send

Commentary by Editor Steve Stroh N8GNJ

Paid Subscribers Update

My thanks to **William Arcand WIWRA** for *renewing* as a **Founding Member Annual Subscriber** to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 10** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 43** for becoming a *new* Annual Paid Subscriber to Zero Retries this past week!

My thanks to the many **Monthly Paid Subscribers** to Zero Retries!

Financial support from Zero Retries readers is a real vote of confidence for continuing to publish Zero Retries.

Just recently, paid subscriptions that provide financial support of Zero Retries has enabled me to fund the [m17-users email list](#) (beyond the 100 max subscribers of the free tier) for promotion of M17 as a working, usable system that is no longer solely a loose collection of related projects.

Zero Retries Has 2000+ Subscribers!

Wow... Now in its *fourth* year of publication, Zero Retries has 2000+ individual email subscribers. Anecdotally, hundreds more people read Zero Retries via RSS feed and from mentions I post every week to 293 followers on [Mastodon \(n8gnj@mastodon.radio\)](#), and 23 followers on [Bluesky \(@n8gnj\)](#). There are a fair number of folks who, on principle, won't subscribe to Zero Retries because it's *currently* hosted on Substack, with all the baggage of that platform (heard, and *understood*).

This latest big bump in subscribers past 2000 is mostly from yet another generous mention in [Amateur Radio Weekly Issue 343](#) on 2024-08-10 by Editor Cale Muth K4HCK:

[Why M17 is significant](#)

No other Amateur Radio digital voice system is as well defined as M17.
Zero Retries

That article is now, retroactively, edited to be *Part 1*. Part 2 appeared in last week's **Zero Retries 0164**.

If You Wonder How Zero Retries Keeps Going...

... a big part of the energy of Zero Retries is generous mentions like this one [from Michael Clemens DK1MI on his blog](#):

Zero Retries

2024-08-11

"Zero Retries is an independent newsletter promoting technological innovation in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology." This is how **Steve Stroh (N8GNJ)**, the editor of **Zero Retries**, describes his weekly newsletter.

But to call it just a newsletter does not do justice to his work. I have been reading and following this site for a long time and am always fascinated by how many high-quality articles he publishes every week. Steve doesn't just limit himself to writing news but is obviously very interested in promoting the hobby of amateur radio and conveying its fascination. Important projects such as the [M17 project](#) are regularly pushed by him in order to help drag this valuable project out of its niche.

In the meantime, the newsletter has reached a size that would justify publishing the content as an ePub (hint hint). I would actually love to read it on an eBook reader.

My recommendation? **Click here, subscribe** and have a nice weekly read on inspiring amateur radio related topics.

First, thank you for the kind words DK1MI! An ePub version for eReaders... *hmm...* I had not previously considered that, but that *does* make sense, and fits with a few other long term plans that are in motion for Zero Retries.

DK1MI is a bit modest in not mentioning *his* (perhaps unintended) role in [creating Zero Retries Interesting content himself](#), including excerpts here in Zero Retries:

- **Zero Retries 0110** - A Declaration of Love to Amateur Radio
- **Zero Retries 0152** - Open Source in Amateur Radio Wiki
- **Zero Retries 0158** - Open Source in Amateur Radio Wiki
- **Zero Retries 0162** - The Beauty of Keyboard to Keyboard Digi Modes
- **Zero Retries 0164** - The QubeDX - a modular CubeSat style QRP Transceiver

DK1MI's **Open Source In Amateur Radio Wiki** - [opensource.radio](#) - is a perfect example of *why I started Zero Retries*. That wiki is a great project¹ to try to gather a quick mention of *all* (eventually... it's a work in progress) open source projects in Amateur Radio so, for example, if you want to find an open source project for (imaginary) a 6809²-based packet radio modem... this would be a great place to start one's search.

If one's only source of Amateur Radio news is the "mainstream" Amateur Radio media, likely you wouldn't ever hear³ of the **Open Source In Amateur Radio Wiki**. Which is just... *not... cool...* considering that a lot of new Amateur Radio Operators are coming into Amateur Radio from younger, techie, hacker / maker communities and the **Open Source In Amateur Radio Wiki** is something that they will find extremely valuable in *adapting Amateur Radio to their priorities* of what a radio-based technical activity should be.

But DK1MI, like Zero Retries, publishes technical content in public, for the benefit of Amateur Radio worldwide and I'm happy to promote such material, and a lot of other great material (that I'm *not* writing - I'm just *mentioning*). If there wasn't all of this Zero Retries Interesting activity going on, or there was extensive coverage of technological innovation in Amateur Radio in the "mainstream" Amateur Radio media... there wouldn't be a need for Zero Retries. So, thank you DK1MI, but do take a bow yourself.

Happy 40th Anniversary to KD7WSF!

Another thing that keeps Zero Retries going is the *incredible* support I get from my wonderful wife Tina Stroh KD7WSF. Tina getting her Amateur Radio license (to satisfy a premarital promise, deferred for a couple of decades) is an epic tale worth telling sometime. The salient point is that Tina has put up with me... *supported me...* **for 40 years of marriage now** (as of Sunday 2024-08-18). Tina has *encouraged me beyond belief* in taking a great leap of faith a couple of decades ago from a paycheck job to trying to make a living as a freelance writer (didn't go so well...) and now in making Zero Retries a success for three plus years now. Recently Tina has taken on the role of Office Manager for Zero Retries, tackling some of the nagging administrivia that inevitably has to be dealt with when there is a pro forma business with minor revenue involved, which frees me up to write. Thank You Honey, and...

Happy Anniversary Honey!

Friendly Amateur Radio Elmers Group on Facebook

Zero Retries is also picking up new subscribers from Facebook. My wife Tina KD7WSF told me about the Facebook group [Friendly Amateur Radio Elmers](#) which she had been participating in, and suggested I join. It is indeed a friendly group, and I occasionally contribute there when I think I can add some unique perspective (generally, digital topics). The moderators do a pretty good job of enforcing "friendly" in the group, though there are the inevitable folks that test the limits. One behavior that's expressly forbidden is the semi-snarky default reply to a question with "Google is your friend". *That* consistently provokes a fast response from the moderators. There are a lot of beginners and folks with unique situations that request specific types of help, and this is one of the few Facebook groups about Amateur Radio that seems to work (again, mostly from hard work by the moderators).

Store and Forward Podcast Also Mentioned in Amateur Radio Weekly

Also in Amateur Radio Weekly Issue 343, K4HCK also generously mentioned the **Store and Forward Podcast** by Kay Savetz K6KJN and I.

[Store and Forward](#)

A podcast about the past and future of Ham Radio.
Store and Forward

... all ~~three~~ four episodes of it to date 😊

[Episode 4](#) features Kay telling his most recent "away team" story of rescuing (literally) unique electronic material as part of the mission of Digital Library of Amateur Radio & Communications. Now that we have a shiny new website (thanks again K6KJN), **Store and Forward** is now mentioned in the **Closing the Channel** section at the end of every issue of Zero Retries. Kay tells the tale, in more detail, in text, in his article in this issue of Zero Retries.

Major Conference Countdowns

- [JARL Ham Fair 2024](#) in Tokyo, Japan on 2024-08-24 and 25, *next* weekend!
- [Pacificon 2024](#) in San Ramon, California, USA on 2024-10-18 thru 20 in 9 weeks. Tina KD7WSF and I plan to attend Pacificon 2024 (which makes it "major" to us). I have offered to do a presentation about Technological Innovation in Amateur Radio, and (I *think*) my proposal has been accepted.

See the **Zero Retries Guide to Zero Retries Interesting Events** for additional events.

Requesting Reports From Recent Zero Retries Interesting Events

Several Zero Retries Interesting Events have occurred recently such as **AirVenture 2024**, **Central States VHF Society**, and the **EME Conference**. I would love to hear reports about those and other recent Zero Retries Interesting events for reporting out to the readership of Zero Retries. An email is fine, or if you'd prefer to write an article, I'm happy to lightly edit it if requested.

Note that I didn't ask for a report for **DEF CON 32** as Zero Retries Pseudostaffer Dan Romanchik KB6NU did a great job reporting out from *that* conference - [DEF CON 32: Another mind-blowing experience](#).

Zero Retries Sponsored Email Lists

Zero Retries now sponsors some email lists for in-depth discussion of topics that I haven't seen addressed by other email lists or forums.

- [new-dcc](#) - Discuss the creation and operation of a conference similar to the long-running Amateur Radio Digital Communications Conference that was formerly sponsored / managed by ARRL and TAPR. I had intended that this would get a fair amount of attention so that there will be a DCC of some kind in 2025, but my attention is going to be deferred for a few months by...

- [902-928-threat-2024](#) - Discusses that NextNav, Inc. has proposed to the FCC to reconfigure the usage / allocations of the 902-928 MHz band which is shared between license-exempt (Part 15) users and Amateur Radio users. Despite NextNav's "assurances" to both of these user bases that they won't be significantly impacted by NextNav's proposal. Make no mistake - this proposal *would severely impact both license-exempt use and Amateur Radio use of 902-928 MHz*. I created this group to attempt to provide some "cross fertilization" between groups of users of 902-928 MHz that otherwise wouldn't be cooperating in their comments to the FCC. This is an experiment, but it seemed worth a try and the threat is significant, and urgent as NextNav asserts that it has priority in 902-928 MHz and thus it's "reasonable" to reconfigure the band per its request.
- [m17-users](#) - Discuss *using* M17 Project technology to build out infrastructure to support M17 (such as repeaters) and the discussion of using M17 devices such as radios, adapters, Internet linking, Software Defined Transceivers (and receivers) etc. m17-users was operating as a free Groups.io email list with a max of 100 subscribers. I've now upgraded **m17-users** to a paid email list and thus it can now accept more users (up to 500 now). **m17-users** is sponsored by Zero Retries (\$20 / month). My thanks to Steven Davidson K3FZT and M17 Project for donations for the first month of operation.

Military HF Communications - Interesting "Contest" Idea

Dale N0KQX comment on Zero Retries 0164:

The military put all their eggs in the satcom basket for a while and realized that wasn't a good idea and reinvested in some hf radio.

I replied:

Dale - Yep - I saw a fair amount of what I guessed was HF whips on DDG 102. It's no panacea though - HF can be jammed fairly easily. Hmm... you just gave me an interesting idea for a Zero Retries article next week - Thanks! I'll credit you.

As N0KQX observed, "HF is *back*" in military communications, and I'll guess that it needs ideas for good, reliable, HF communications beyond the expediency of 10 kW transmission power from ships and shore stations.

What if there was a contest on Amateur Radio HF where the communications were *encouraged* to be stealthy *and* reliable as an example of the ingenuity of Amateur Radio Operators? Just a few ground rules (and, again, as I propose this, such a contest is *completely imaginary... at the moment*):

- The contest runs for only 6 hours or so - long enough to prove out the concept, but not long enough to disrupt any significant Amateur Radio activity.
- The 30 meter band seems like a good place to conduct this contest.
- The contestant has to establish a connection over HF with another station at least 1000 km away. (The assumption that there will be pairs of operators using the same experimental system.)
- The contestant has to pass at least 1 MB of data another station during the duration of the event. The data transfer does not have to be continuous. For reference, [VARA HF](#) "Tactical, Level 17" can transfer up to 8489 bps, which would require (by my math) ~ 16 minutes to transmit 1 MB of data (not counting acks and retransmissions, etc.).
- The transmission has to be identified with the call signs of the two stations (in-mode is acceptable).
- The experimental mode has to be publicly documented on a website, with contact information.
- *After* the contest, all of the participants disclose their participation on a common website.
- Adding some interest to the contest, perhaps there could be several geographically dispersed Software Defined (Web) Receivers that record the entire band during the contest for later playback / analysis.

The idea is that the military doesn't have to transmit back into Amateur Radio spectrum, but they can monitor the activity of the contest. If they observe a system that looks interesting, they could contact that station for more info.

The "best case scenario" in such a contest would be that the military was monitoring... *and didn't detect that a particular experimental system was actually in use*, but it was proven that it was in use and moved a significant amount of data.

Prior to the creation of [WSPR](#) and the other [WSJT-X modes](#), it wasn't well-understood that such communications *were possible on HF*, with signals so far below the noise floor. Now we know that such things *are* possible, and we've got more cheap computer power than ever to use in implementing even more impressive modes.

And... I'm not counting out the potential for Artificial Intelligence / Machine Learning techniques to create (and operate) such new modes.

I Love Living In The Future

Lastly... on this happy (for Tina and I) and sunny weekend, I just had one of those "living in the future" moments. Our daughter and son-in-law have two cute, young cats (our Grandkittens). She regularly sends us short video clips which we always enjoy. As I was finishing up this issue of Zero Retries, I happened to be away from my phone when one video clip arrived, but my watch was within range of my phone, so I was notified. Absentmindedly I tapped on my watch to acknowledge, and the video started playing... *on my watch*... complete with *audio*!

To someone like me that grew up with *no* personal computers, to progress to this marvel of technology, within one lifetime, really does feel to me like we *are* living in the future⁵. Thus how can I *not* have that *same sense of wonder and optimism* about this most futuristic of hobby activities - **Amateur Radio**, where we actually get to participate in *making* the future such as M17 and other bleeding edge radio technology projects?

73,

Steve N8GNJ

Leave a comment

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Playing for “Those Five”, Microcomputers in 1976, Linux... and the M17 Project

By Steve Stroh N8GNJ

This first section is a story that I include in the Thank You email to paid subscribers to Zero Retries who choose financially support Zero Retries, despite no extra benefits (to date) for doing so, other than my additional attention to them when they email or call. I think it helps frame the situation in Amateur Radio between those that get M17, and those that don't get M17.

Playing For Those Five in Zero Retries

One of my “virtual mentors” in becoming a writer and starting Zero Retries is the late microcomputer pioneer and author [Don Lancaster](#). One of the most profound things (to me) that Lancaster has ever written was this [brief passage](#) that he only ever mentioned a few times:

Many years ago, I was at a rock concert. The opening act was a single flute player standing solo in front of the closed stage curtains. His job was to warm up the audience for the high priced talent that was to follow. He was good.

But as he went along, the musical vibes got stranger and stranger, then totally bizarre. He was playing **chords** on his flute. Combined with utterly unbelievable riffs. Much of the audience got impatient and bored at what seemed like a bunch of gawd-awful squawks.

Then I happened to notice a friend beside me who had both been in and taught concert band. He was literally on the edge of his seat. He turned to me and slowly said “**you ...can't...do...that...with...a...flute**”.

Of the thousands and thousands of people in the theater audience, at most only five realized they were witnessing a once-in-a-lifetime performance of the absolute mastery of a difficult and demanding instrument.

Always play for those five.

This passage just resonated with me, and in starting Zero Retries, I decided that I was going to write for “those five” and not attempt to write Zero Retries for a mass audience. Rather, I would embrace Lancaster's advice and write for “those five” that shared my enthusiasm for technological innovation in Amateur Radio and the role that Amateur Radio can play in advancing technological progress by exposing people to hands-on radio technology and potentially influencing young people into careers involving radio technology. We need them *now*, and we're going to need a *lot of them* in the future. Hopefully Zero Retries can help do so, at least in a small way.

Thus I write Zero Retries for “those five”, and I'm humbled that there are *a very few of you* who chose to step up to be Founding Members and Paid Subscribers to indicate your *substantial* support for what I'm doing in Zero Retries.

...

Writing about the potential I see in M17 is part of writing for “those five” (well, 2000+ of you now...). In having written extensively now about M17 Project and its role in Amateur Radio, it's become apparent to me that there is a very pronounced schism regarding M17 versus other VHF / UHF digital voice systems.

Open, *Schmopen*. They Don't Get It.

The majority of Amateur Radio Operators don't understand what the fuss is about M17.

The majority of Amateur Radio Operators generally get that Digital Voice on VHF / UHF is somewhat superior in some ways to “plain old FM”, and have bought into one of the three variants of VHF / UHF digital voice - Digital Mobile Radio (DMR), D-Star, or System Fusion (SF)... and having made their choice of one of those three, call it good. The majority of Amateur Radio Operators don't see the *point* of yet another variant of VHF / UHF digital voice.

But, to a minority of Amateur Radio Operators... which in my observations are the newer Amateur Radio Operators who trend younger, techie, and proudly count themselves as part of the Hacker / Maker community... DMR, D-Star, or SF were never an option because they aren't open (or at least weren't all the way open). In fact, in several private email threads with me, some folks have told me that they weren't interested in Amateur Radio *at all*... until they learned about M17 and that it's *open*. Having learned that M17 was an option... *then they became interested in Amateur Radio*.

M17 is a very big deal to them because it's entirely open. There's no trademark or copyright on the *name*. The specification is open. The hardware designs are open. The software designs are open. The Internet interfaces are open. The critical CODEC for converting analog voice into an efficient data stream and back into voice is [Codec 2](#), not proprietary like every other VHF / UHF digital voice system. In a phrase, M17 is *their* kind of Amateur Radio because M17 is *open*.

I think this hypothesis is being proven out by the experiences Dan Romanchik KB6NU is having at various “hacker” conferences this Summer - [HOPE](#), and most recently DEF CON 32 - [DEF CON 32: Another mind-blowing experience](#). KB6NU is exposing younger, techie, hackers and maker folks to Amateur Radio in a way that is relevant to them, and they quickly become interested. *Hacking? Radio? Together you say?* Thus they become licensed at the VE session at the same conference.

Thus... there's a very real schism between the “open, *schmopen*” majority, and the “if it ain't open, *I'm not goin'*” minority.

Analogy - M17 and Microcomputers in 1976

I offered an analogy about M17 versus proprietary Amateur Radio digital voice systems on the m17-users email list - [1976 and M17](#):

M17 versus the status quo of Amateur Radio digital and FM repeaters is analogous (in my mind) to the computer industry in 1976.

In 1976, mainframes and minis were doing the job satisfactorily for the computer industry. Everyone that needed and could afford a computer had one. That's analogous to the current repeater technology and the current repeater owners.

But in 1975, one year earlier, microcomputers had come on the scene. The MITS Altair was unveiled in the [January 1975 issue of Popular Electronics magazine](#). By 1976 a completely *new* crowd entered the "computer industry" and were using these new (and still very imperfect, by mini and mainframe standards) microcomputers to do computing very differently than was possible with mainframes and minis.

The microcomputer folks didn't ask "permission" from the mainframe and mini folks, and they didn't try to persuade the mainframe and mini owners that microcomputer were "better" and they should start doing / using microcomputers.

Instead of asking permission or trying to persuade, they just started doing things *their own new way* with microcomputers and rapidly evolved an entirely different version of the computer industry.

A decade later, the mainframe and mini computer industry looked around and said "what happened?!?!?" *All* of the energy in the computer industry had shifted to *microcomputers*.

...

In my opinion, from deep observation of M17 and trying to explain it and write about it substantively...

M17 in 2024 is at the "computer industry circa 1976" point of inflection.

Like microcomputers, M17 is open. Thus there's no structural issue that prevents M17 from rapidly growing and evolving.

A Better Analogy From a GenXer - M17 and Linux

As good as an analogy as I thought that was... Cale Mooth K4HCK offered a [far better analogy](#), from *his* generation's perspective:

For the post-minicomputer generation, the relevant genX analogy will be that of Linux vs. Windows. Linux offered the same open source freedom that M17 does today in that it was a completely accessible, modifiable, and "free" alternative to Microsoft that we could tinker with. Today, almost every server on the internet runs Linux. If the M17 future follows that path, we'll see a ubiquitous mode found on nearly every transceiver. And people won't really think about it.

It's exciting to me as a "techie" because it can be entirely a software interaction. The intersection of software and RF is what got me interested in the hobby, and this extends that world of freedom and possibility.

People will be persuaded to invest in M17 once they can see the benefits over other modes in practical application. That will come as the early adopters continue to build on this initial success and showcase what's possible.

K4HCK is of the generation that *matters* in this discussion - *they've got decades ahead of them* to contribute to Amateur Radio... *or not*, if they aren't convinced that Amateur Radio offers *their* generation opportunities compatible with *their* interests and priorities.

So... yes, thank you so much K4HCK for this far better analogy to explain the open nature of M17 and why it matters - as much as Linux being open versus Windows not being open matters.

I'm a bit more skeptical than K4HCK of the "build it and they will come" approach of evangelizing and building out M17 systems will entice more users (beyond the "*you had me at open and radio technology*" folks... at least through the end of this decade. I don't think that M17 quite represents a "TNC-2" moment in Amateur Radio where the TNC-2 offered something that didn't exist before it. From my perspective, most Amateur Radio Operators see digital voice on VHF / UHF to be an (over) solved problem with DMR, D-Star, and SF.

Thus I don't think this schism *can* be bridged. My experiences to date have led me to believe that it won't be very effective to evangelize M17 as an alternative to the other digital voice systems. I think the "*I just don't get it about M17*" contingent in Amateur Radio is just going to have to be routed around by the folks with the energy, the better M17 technology (which will evolve faster and take advantage of new computer and radio technology)... and the youth to outlast the majority.

Instead, I think the M17 community should put our energy into extending M17 such as adding digital signatures, building out new M17 infrastructure, assisting new M17 users that are really interested in getting on M17, creating new devices, and evangelizing to the younger, techie, hacker / maker folks that would be receptive to "hack with *radio technology* - get your entry level Amateur Radio license and start playing with M17 and other open systems in Amateur Radio".

I can easily imagine setting up localized M17 repeaters that cover perhaps a college campus, that will probably get more use with data / messaging than digital voice. How to set up such an M17 repeater will be a big focus of the M17 book that I'm working on.

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Followup to The LEO Satellite Industry Needs More Engineers

*This is an email from Witold Kinser VE4WK in response to two mini-articles in **Zero Retries 0162**:*

- *Calculated Ignorance of Amateur Radio (Request To Send)*
- *The LEO Satellite Industry Needs More Engineers (ZR > BEACON)*

As VE4WK acknowledges, there was no hint of Amateur Radio involvement in the article cited by KB6NU, and later my mini-article. Apparently that omitted mention of Amateur Radio is now considered to be an oversight.

Thank you for Zero Retries and LEO SatS

Dear Steve,

Thank you very much for your effort in delivering an excellent Amateur Radio newsletter. I always find something very interesting in each issue.

In Zero Retries 0162 (Beacon), you mentioned an article "The LEO Satellite Industry Needs More Engineers," by Kathy Pretz in IEEE Spectrum Online (2024-01-07) that describes our IEEE Future Directions LEO Satellites and Systems (LEO SatS) Initiative, but did not mention amateur radio (AmRad) explicitly. I agree, it was a significant mistake. I apologize.

My apology also goes to Daniel M. Romanchik, KB6NU, who alerted you to the IEEE Spectrum article in his KB6NU Ham Radio Blog.

However, I assure you that we use ham radio bands to operate our satellites. I started designing, building and testing 3U Cubesats in 2010 with 130 students and 70 advisors from academia, industry, business, military and governments. Each generation takes two years to complete. Many university/college students have become certified ham radio operators through my course on amateur radio theory and operations. My new AmRad Basic Qualifications course will start in January 2025. I also taught Advanced and Morse Code courses. Many of those students are now in leading positions in the aerospace industry. So, amateur radio has been at the centre of all our activities.

The IEEE LEO SatS Initiative is preparing student competitions to develop new subsystems and algorithms for the nanosatellites to improve communications between the satellite and the terrestrial federated networks through two-level undergraduate and graduate student competitions.

An experienced ham and the Operations Lead of the IEEE MOVE Team (<https://move.ieeeusa.org>) is an advisor of the LEO SatS.

We are also preparing an interesting and free-of-charge sixth workshop on LEO SatS this November. If you wish, I could send you information on the topics covered so that you could include it in the Zero Retries Newsletter.

Another LEO SatS development that might interest the AmRad community is a series of workshops on CubeSat and CanSat development using inexpensive kits. The workshops will address improvements and even new approaches to data communications on AmRad bands.

Kind regards,
Witold VE4WK

My thanks to VE4WK for his kind words and such a gracious followup to a mildly critical pair of mini-articles. One of the best parts of publishing online is that you can fix issues like this. Those two mini-articles in **Zero Retries 0162** now have a pointer to *this* article so future readers of those mini-articles won't be left with the wrong impression.

In the bigger picture, as VE4WK describes, there *is significant crossover* between Amateur Radio and the work of the [IEEE](#) (Institute of Electrical and Electronics Engineers) in reaching out to students to encourage becoming an Electrical / Electronics engineer. IEEE's "public" publication, [IEEE Spectrum](#) does a good job in [exposing some Amateur Radio activity](#) to its membership that otherwise might not be aware of Amateur Radio (and doing fun stuff with radio technology).

But it seems odd that there isn't a more *formal* involvement between IEEE and Amateur Radio... perhaps even a Special Interest Group within IEEE *specifically to encourage more technical Amateur Radio activities*.

For example, an interesting overlap between IEEE's activities and Amateur Radio is the development of the [IEEE 802.11ah Wireless Local Area Network standard](#). 802.11ah, and the tightly related Wi-Fi Alliance certification for [Wi-Fi HaLow](#) seems poised (in my observation) for significantly increased usage of the 902-928 MHz band in the US, which is shared between unlicensed uses such as 802.11ah / Wi-Fi HaLow and Amateur Radio.

An IEEE SIG for Amateur Radio... (again, just fantasizing)... *that* would be cool, and of course, Zero Retries Interesting!

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What's New at Digital Library of Amateur Radio & Communications - August 2024

By Kay Savetz K6KJN
Zero Retries Pseudostaffer
Internet Archive's Program Manager, Special Collections

Hello from — not DLARC World Headquarters as usual, but from 30,000 feet somewhere over the midwest United States. I'm headed back to HQ following a successful field trip to collect radio books and manuals for the [Digital Library of Amateur Radio & Communications](#). With that in mind, this column will be less "What's New at DLARC" and more "What I Did This Summer."

Months ago, I read in [Amateur Radio Weekly](#) that [Fair Radio Sales](#), a radio surplus store in Lima, Ohio, would be closing. After running the place for more than 40 years, the proprietor Phillip Sellati is ready for a well-deserved retirement. I reached out to Phillip to ask if he would donate leftover radio books and manuals to DLARC. He agreed. Flash forward to last weekend, when two assistants and I arrived at Fair Radio's massive warehouse in beautiful Lima. Phillip gave us carte blanche to take everything we wanted for DLARC.

I can hardly express how large this warehouse is and how much reading material was available for us: commercial radio manuals, military documents, avionics repair guides, parts catalogs, schematics... on shelves and in stacks and filling up filing cabinets. It took our three-person team two ten-hour days to box it all up. I rented a U-Haul van and drove the material directly to Internet Archive's scanning center, about an hour and a half away in Fort Wayne, Indiana. In two round trips I delivered about 200 boxes of radio reading material to the scanning center.

When I needed a little break from driving and boxing up manuals, I took a few minutes to explore the massive warehouse. Soooo many radios and gear,

literally stacked to the rafters. I noticed once-upon-a-time top-of-the-line Kenwood ham gear and military radios seemingly going back to WWI. All guarded by a very good old dog named Reagan. You can [see some pictures from the trip](#) (yes, including Reagan.)

Fair Radio was among the last of the great surplus places. [Check out their web site](#) while you can. We at DLARC are deeply grateful to Mr. Sellati for his generous donation of material. He was especially kind in giving us access before everything else went to auction August 15-17.

The scanning center will start on the Fair Radio material soon, but it will certainly take them months to get it all done, interspersed with their other scanning work. I'll keep you updated as their work progresses.

The expedition to Fair Radio was actually my second away mission for DLARC this summer. In July, I flew to Denver to sort through the collection of Robert Cooper. This time, I was on my own, digging through seven pallets of material from the estate of Mr. Cooper. He was a ham, but was primarily known as an expert in satellite and cable TV communications. In the '80s, he was one of the first people to figure out that HBO transmitted its satellite signals unencrypted. He published an article about how anyone could set up a satellite dish in their backyard to get free TV. These ideas led to an entire industry of TVRO (television, receive only) satellite dishes, lawsuits, and a years-long escalating war of scrambled signals and television descramblers. That whole story arc is well-documented by the various print publications and television programs that Coop produced.

So there I was in a warehouse in Denver, trying to get a grip on all that material. Magazines and books and videotapes, but also decades of personal correspondence, project notes, business records, photographs, and legal paperwork. To his credit, Mr. Cooper saved *everything*. It was my job to decide what was worthy of being preserved. It took three days in the warehouse, but in the end, I shipped off 18 boxes of videotapes and 21 boxes of magazines and books to the scanning centers. I sent another two big boxes of CD-ROMs and DVDs and various other media to myself at DLARC World Headquarters to dig through later.

As that material gets digitized, the [Bob Cooper collection](#) in DLARC is growing. It's early, but you can already find there [the complete run of Coop's Satellite Digest](#), Cooper's magazine covering the birth of the home satellite industry. It was published from October 1979 through April 1987. And, [a complete run of SatFacts](#), his publication covering the world of satellite television in the Pacific and Asia, published from September 1994 through August 2004. And, the [complete run of Community Antenna Television Journal](#), which was published from 1974 through 1979. AND [the entire run of Cooper James Report](#), also known as CSD2, a short-lived publication directed at TVRO manufacturers and distributors. It was published from August 1983 through September 1985, concurrent with the publication of Coop's Satellite Digest.

That's the tip of the iceberg: Cooper had many more publications and projects. There will be a whole lot more in the coming months as we continue to process and digitize what I found in Denver.

I talk even more about both of these away missions on the [Store & Forward podcast](#), my new podcast with Zero Retries editor Steve Stroh. You can hear the audio versions in your favorite podcast app, or [watch the video version](#), hosted at DLARC, naturally.

...

Digital Library of Amateur Radio & Communications is funded by a grant from Amateur Radio Digital Communications ([ARDC](#)) to create a free digital library for the radio community, researchers, educators, and students. If you have questions about the project or material to contribute, contact me at kay@archive.org.

DLARC want list: <https://archive.org/details/dlarc-wantlist>

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

ARRL and Meshtastic Publicize the Fight to Save 902-928 MHz

[ARRL Urges Protecting the Amateur Radio 902-928 MHz Band](#)

The Federal Communications Commission (FCC) accepted for public comment a [Petition for Rulemaking filed by NextNav Inc.](#), a licensee in the 900-MHz Location and Monitoring Service (LMS), to completely reconfigure the 902-928 MHz band and replace the LMS with high-powered 5G cellular and related location services.

...

ARRL is preparing comments urging protection of existing and future amateur uses in this band. ARRL urges all amateurs to study the proposal and file their own comments describing their activities in this band and the expected effect of the proposed changes. The filing deadline is September 5, 2024. Replies to comments are due by September 20, 2024. [Click here for a guide to filing comments.](#)

[Meshtastic's Opposition to Proposed Changes on 900 MHz Band](#)

The Federal Communications Commission (FCC) is currently considering a proposal from NextNav that could drastically reshape the 900 MHz band. While this proposal may seem like just another routine reconfiguration, it has significant implications for a broad range of users, particularly those who rely on unlicensed spectrum for innovative, community-driven projects. At the heart of the debate lies the potential impact on open-source initiatives like Meshtastic, an open-source, decentralized communication platform that operates in the 900 MHz ISM band.

As a community, we are raising our voices in opposition to this proposal, and here's why we believe it's crucial for all stakeholders, especially amateur radio operators, tech enthusiasts, and public safety advocates, to understand the ramifications of this change.

Understanding the 900 MHz Band and Its Importance

The 900 MHz band is a critical piece of spectrum used for various applications, including industrial, scientific, and medical (ISM) purposes, as well as amateur radio. It's a unique band that supports a wide array of technologies, from garage door openers and baby monitors to more advanced uses like Meshtastic's decentralized communication networks.

Meshtastic leverages LoRa (Long Range) technology to facilitate long-distance communication without relying on centralized infrastructure. This capability is especially valuable in remote areas where traditional communication networks are either unavailable or unreliable. The proposal by NextNav threatens to disrupt this delicate balance by reallocating portions of the 900 MHz band, which could severely impact these unlicensed applications.

...

These two organizations representing non-commercial user communities are only the leading edge of what will likely be a *tsunami* of opposition to [NextNav's petition](#) at the FCC, and the [FCC's Request for Comments - Docket 24-240](#). There are *entire industries* that have been built on using 902-928 MHz without the requirement of a license, and they're "getting along" with the many competing users in 902-928 MHz... unlike NextNav. One prominent company that will almost certainly file comments is Amazon, which builds a neighborhood area network into their home devices, operating on 902-928 MHz (in the USA) called [Amazon Sidewalk](#).

One primary argument I will be making is that NextNav *knew the mixed environment and unusual rules* when they bought their licenses in 902-928 MHz... and now want to change those rules.

There are already [150+ comments on Docket 24-240](#). There will be hundreds more, perhaps thousands in the next few weeks. But there's a tight deadline:

- Comment Period End Date: Sep 05, 2024
- Reply to Comment Period End Date: Sep 20, 2024

I have started a small, private email list for those who are involved in Amateur Radio (including manufacturers, etc.) or closely related such as Meshtastic so that we can "cross fertilize" our comments to make the strongest case possible in opposition to NextNav with the FCC. Email me if you'd like to participate on that email list.

[The M17 Project - Article by Ira Brodsky KC9TC](#)

This *great* article - **The M17 Project** by Ira Brodsky KC9TC, mentioned in Zero Retries 0164 last week, is now available online via Digital Library of Amateur Radio & Communications (DLARC), and will be (hopefully soon - *technical difficulties*) on the **M17 Project** website.

This article originally appeared in the [May, 2024 issue of RSGB RadCom Magazine](#). This article is **Copyright © 2024 by RSGB** and is reproduced with kind permission of the RSGB. If you'd like to get this issue of RadCom, or any other RSGB merchandise, the **RSGB Shop** is at <https://www.rsgbshop.org/index.html>.

My thanks to Ira Brodsky KC9TC for 1) writing such a great article that explains M17 *so well*, and 2) working things out with RSGB on behalf of the M17 community for RSGB to allow this article to be made publicly available.

[NW Digital Radio's DRAWS Going Back Into Production](#)

Bryan Hoyer K7UDR of NW Digital Radio on the main@nw-digital-radio.groups.io email list:

Hi All,

DRAWS™ Goes on Backorder Discount Next Week, delivery Mid-September.

This will be the last run of 140 Units as we are moving to a new GPS Receiver.

We will be doing an update to the board and have created a new subgroup, Evolution, to discuss feature requests and new product ideas. Please join and share your input!

I'm a fan of [NW Digital Radio](#) not just because they're a manufacturer of Zero Retries Interesting products from this region (Friday Harbor, Washington, USA), but because I know all of the principals including Silent Keyboard John Hays K7VE.

As a small electronics manufacturer, NW Digital Radio got hammered in the great components shortage of a few years ago, and I'm glad to see that they're back to the point of resuming production. [DRAWS](#) is a cool data modem designed for use with Raspberry Pi computers, and includes support for two radios via standard 6-pin MiniDIN connectors, a 12V input which powered the modem and computer (with ample power margin), some *analog* IO channels, and an onboard GPS receiver with battery backup (for faster acquisition of GPS data compared to a cold start). NW Digital Radio was careful to design in full compatibility with higher speed modes like 9600 bps (and faster) when using Frequency Shift Keying (FSK) modulation.

But the best part of DRAWS... is the very cool case that NW Digital Radio had custom made for DRAWS:



Image courtesy of NW Digital Radio

There's definitely going to be a "to do list" for DRAWS 2 (?); for example, the RPi 4 and RPi 5 have emerged while DRAWS was out of production, and those have some quirks not present with the Raspberry Pi 3 (which will remain in production for the foreseeable future).

The new Evolution group for NW Digital Radio is at <https://nw-digital-radio.groups.io/g/Evolution>.

I think I scored the coveted "first post" on the Evolution list! (Gosh I'm such a geek at times.)

Recommendation of Repeater Builder STM32_DVM for M17

Founding Member Annual Subscriber William Arcand WIWRA via email:

[I have been] playing with M17 very early on using various methods you recently outlined. Of course today I use my CS7000 M17 mostly, with a stm32-dvm connected to a FTM-6000' 9600 baud data port. Setting deviation, etc is quicker and easier than some mmdvm modems in my opinion. I am not about to get rid of my mmvdm setups, but that stm32-dvm board is rock solid, and is now my "reference" setup.

I confirmed that the unit WIWRA mentions is manufactured by **Repeater Builder** - [RB_STM32_DVM](#). That's a great recommendation (especially since I also have a Yaesu FTM-6000R) as a foundation for one's experiments with various M17 units. It's so cool to keep hearing these reports about the [Connect Systems CS7000 M17](#) portable radio that includes M17 out of the box (with the occasional firmware update).

Despite no mention of M17 on the RB_STM32_DVM product page, I'll [reprint this from the m17-users email list](#):

I just clarified in an email with Scott Zimmerman N3XCC of Repeater Builder, that their version of MMDVM, which they call RB_STM32_DVM V4 (latest) - <https://www.repeater-builder.com/products/stm32-dvm.html> does support all the same modes as the current MMDVM firmware:

- D-Star
- DMR
- System Fusion
- P25
- NXDN
- M17

- POCSAG
- AX.25
- FM

IE, it's just another MMDVM device.

The current verbiage on that web page omits

- M17
- POCSAG
- AX.25

But those modes are supported by the V4 hardware, assuming the version of firmware loaded onto the unit is the latest.

Thus, there is "repeater grade" hardware, and more importantly documentation and support, available to add MMDVM support to many / most Amateur Radio FM repeater systems.

This is really good news for breathing life into tired old, increasingly unused Amateur Radio FM repeaters.

[Rhizomatica Mercury Open Source HF Modem Public Demonstration](#)

Peter Bloom on the ARDC Community email list:

Greetings from Rhizomatica.

With support from ARDC, we have been working on a software-defined modem called Mercury for quite a while and are excited to share two videos of it in action. Much more info to come, including tutorials.

Feel free to contact us with any comments or questions!

On the email list, I asked:

Could you outline the advantages of Mercury that you've been able to achieve to date that are better than competing HF modems?

There was quite a [detailed, technical response to my question](#), and I'll just provide some limited excerpts here. See the link for full details.

Here is Rafael, PU2UIT, working in the project. Right now we are demonstrating the physical layer, so you read and write from/to the modem just the raw frames (ready to be used, already error-corrected). Here are the frame sizes for each mode (frame size in "full" octets, in bits and the remaining data not byte aligned):

CONFIG_0 (84.841629 bps), frame_size: 12 Bytes / 100 bits / 4
non-byte-aligned bits

...

CONFIG_16 (5735.294118 bps), frame_size: 162 Bytes / 1300 bits / 4
non-byte-aligned bits

The following setup for each mode (
https://github.com/Rhizomatica/mercury/blob/eaff517be7ccbad07084e6ee8d6847d2ebda7a33/source/physical_layer/telecom_system.cc#L1347
):

CONFIG_0:
modulation BPSK
ldpc_rate 1/16

...

CONFIG_16:
modulation 32QAM
ldpc_rate 14/16

Our primary target is the sBitx, which is the radio we use in our deployments, but I'm carrying now tests with an ICOM IC-7100 to make sure everything is working with a more standard radio.

So far we're not comparing with other HF modems yet, as our ARQ code is not yet production, but already integrated with TNC commands mostly VARA compatible, just set the ports to 7002 (control port) and 7003 (data port). Indeed, I tested some VARA HF ARQ software we have (namely <https://github.com/Rhizomatica/hermes-net/tree/main/uucpd> and <https://github.com/Rhizomatica/mercury-connector>) with Mercury and they worked (but expect some bugs in ARQ system at this point).

We aim to be able use free software in the HF solution we provide in our project. Right now we use VARA in our deployments. Our aim is that Mercury will be able to substitute VARA in our deployments. In replacement at first, then keep evolving. For example, right now we are testing Mercury in pre-production mode to be used for data broadcast in carousel mode (using RaptorQ, code here: <https://github.com/Rhizomatica/hermes-broadcast> for emergency alerts and other small (or not so small) message broadcast. We'll deploy this version in Bangladesh, at fishing boats / for fishermen at Kuakata region at the Bengali bay.

A [follow-on comment](#) by Dan Cross:

This brings joy to my heart! I love to see UUCP used over HF.

Oh... *I so agree* with Cross about seeing [UUCP](#) used for Amateur Radio!

There's additional interesting technical detail in the thread - I recommend reading the entire thing (not to mention subscribing to the [ARDC Community email list](#)).

It's not only cool that they've been so hard at work on Mercury, but that their target for using it is the [sBitx radio](#). A capable open source modem and data communications system running on an open source radio! Kudos to [Rhizomatica](#) for this work, and kudos to [ARDC for funding this work by Rhizomatica](#)!

Leave a comment

Share

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out

Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing *Thanks* to:

- Tina Stroh KD7WSF for, well, *everything*!
- **Founding Members who generously support Zero Retries financially:**
 - Founding Member 0000 - Steven Davidson K3FZT (Renewed 2024)
 - Founding Member 0002 - Chris Osburn KD7DVD (Renewed 2024)
 - Founding Member 0003 - Don Rotolo N2IRZ (Renewed 2024)
 - Founding Member 0004 - William Arcand W1WRA (Renewed 2024)
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 - Founding Member 0006 - Todd Willey KQ4FID
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- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

Want to Support Zero Retries?

- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.
- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your [QRZ](#) page (or other web presence) and include a link:
<https://www.zeroretries.org>
- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:
Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- [Dan Romanchik KB6NU](#) mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- [Jeff Davis KE9V](#) also mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- [Amateur Radio Weekly](#) by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories that often feature "Zero Retires Interesting" topics.
- [Experimental Radio News](#) by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It's a *must-read-now* for me!
- [RTL-SDR Blog](#) - *Excellent* coverage of Software Defined Radio units.
- [TAPR Packet Status Register](#) has been published continuously since 1982.

- [Hot Iron - The Journal of the Constructor's Club](#) is a delightful quarterly newsletter.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- [HB9BLA Wireless](#) by Andreas Spiess HB9BLA
- [KM6LYW Radio](#) by Craig Lamparter KM6LYW (home of the [DigiPi project](#))
- [Modern Ham](#) by Billy Penley KN4MKB
- [Tech Minds](#) by Matthew Miller M0DQW

These podcasts regularly feature Zero Retries Interesting content:

- [Ham Radio Workbench](#) by George Zafiropoulos KJ6VU (and friends)
- [Foundations of Amateur Radio](#) by Onno Benschop VK6FLAB

Zero Retries is currently using the [Substack email publishing platform](#) to publish Zero Retries. It's particularly suitable for small newsletters as you can get started for no cost.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join **2000+** other subscribers:

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Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

[Zero Retries / N8GNJ on Mastodon](#)

Zero Retries (N8GNJ) is also on Bluesky — [@n8gnj](#) — just click:

[Zero Retries / N8GNJ on Bluesky](#)

Email issues of Zero Retries are “instrumented” by [Substack](#) to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- [Store and Forward Podcast](#) - a podcast about the past and future of amateur radio, by Kay Savetz K6KJN (curator of the [Digital Library of Amateur Radio and Communications](#)) and Steve Stroh N8GNJ (Editor of the Zero Retries newsletter.)
- [SuperPacket blog](#) — *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs in Bellingham, Washington, USA*

Thanks for reading!

Steve Stroh N8GNJ / WRPS598 (He / Him / His)

These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham ([The City of Subdued Excitement](#)), Washington, USA, and linked to the Internet via [Starlink Satellite Internet Access](#).

2024-08-16

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Footnotes for this Issue

[1](#)

Sad to say, I've been too absorbed in Zero Retries and related projects like the recent attempt at hostile takeover of a majority of the US 902-928 MHz band to contribute my favorite examples of open source projects to the Open Source In Amateur Radio Wiki. But doing so is definitely "on the list".

[2](#)

When I first wrote this, it was a gratuitous plug for my favorite 8-bit processor, the Motorola 6809 which was used in the [Tandy / Radio Shack Color Computer series](#). But something nagged at me and I finally remembered that the 6809 was also used in the TAPR TNC-1, which, unfortunately, there is no good capsule description online to link to.

[3](#)

As an indication of how absurd things have become in "mainstream" Amateur Radio media, one primary Amateur Radio publication prefers to reprint tens of pages of archival material every month *instead of promoting technological innovation in Amateur Radio*. And, they hide what content they do publish behind a paywall, where only a small minority of Amateur Radio Operators worldwide will *ever* see that content.

[4](#)

For perspective, *my* watch isn't the most advanced version (I'm... *checking...* *six* generations behind the current model), and it also doesn't have the optional cellular modem (AKA, the "[Dick Tracy](#)" option). Yet my *watch...* does *video*. Mind. Blown.

[5](#)

If I tried to describe this to my daughter, she'd probably say "Oh. Tuesday." This stuff is "native" for *her* generation.